

Isoetes araucaniana, a New Species from Southern South America

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ABSTRACT.—*Isoetes araucaniana* is newly described from central Chile. This aquatic species is endemic to Araucanía and is the only southern Andean species with strongly and densely reticulate megaspores.

KEY WORDS.—*Isoetes*, new species, South America

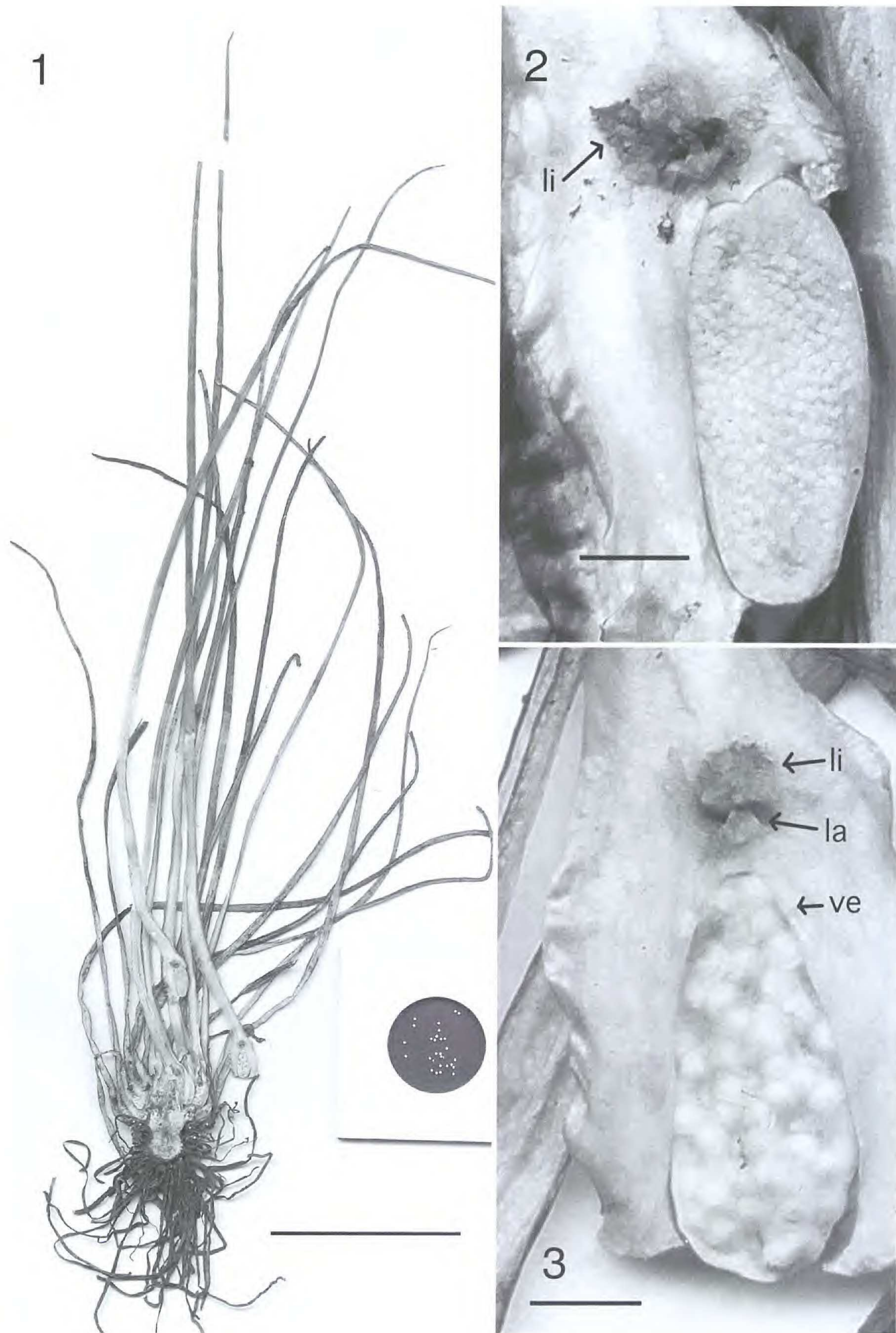
As part of studies of *Isoetes* in southern South America, a new species was discovered among undetermined specimens from Chile. This new species is distinct among species of the southern Andes in having reticulate megaspores, an incomplete velum, and essentially laevigate microspores.

Isoetes araucaniana Macluf & Hickey, *sp. nov.* TYPE.—CHILE. Provincia de Malleco, Parque Nacional Nahuelbuta, sector Piedra del Aquilla, 37°42'S, 72°59'W, 800 m, at the edge of a small stream, in the water, 8 Feb 1991, M. DeVore 1590 & M. Baeza (holotype: MU; isotypes: CONG, F, OSH). **Figs. 1–10.**

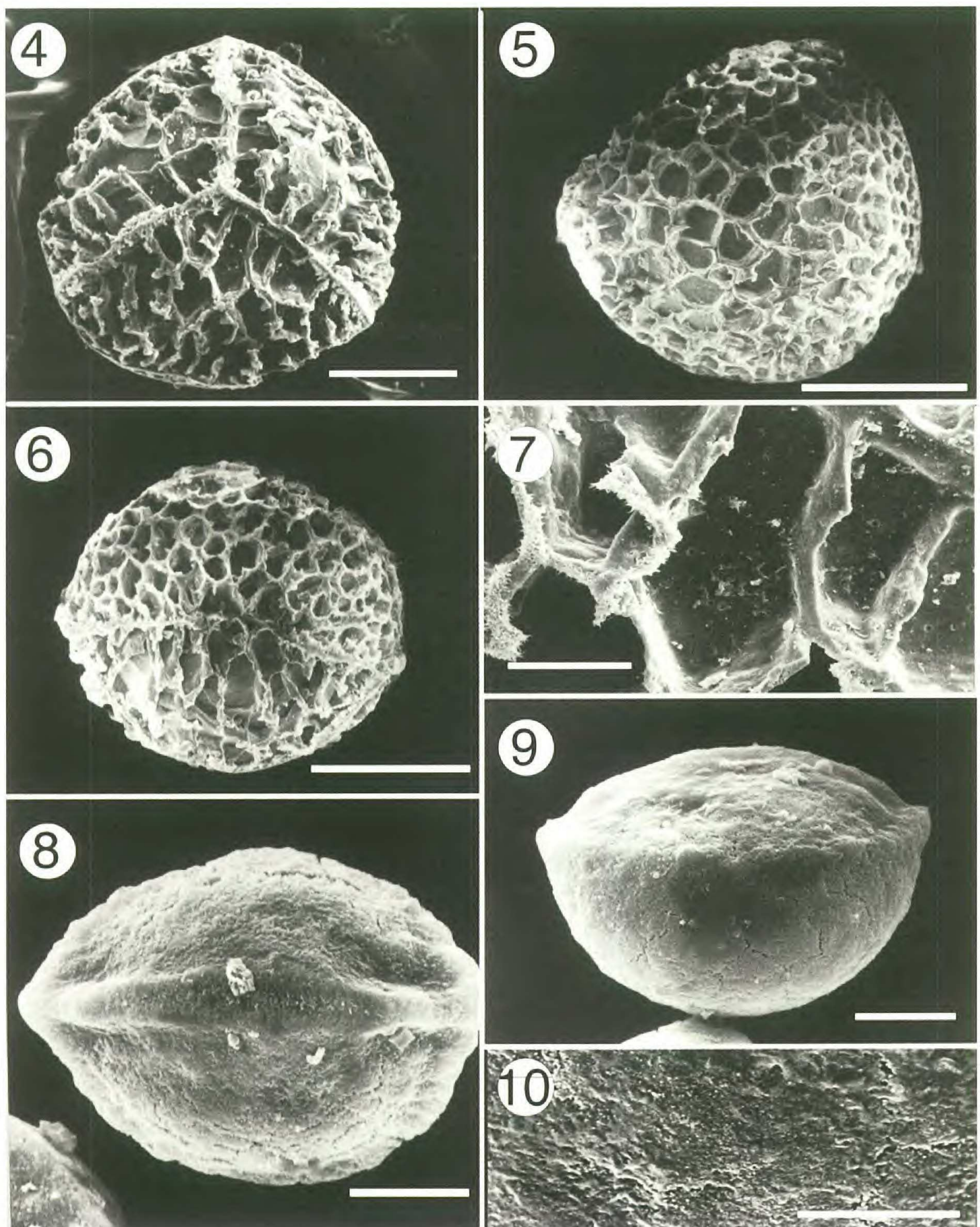
Cormus globosus, 2–3-lobatus, 10–18 mm latus, 11–14 mm elatus; *radices* dichotomae. *Folia* 10–38, erecta, 11–30 cm longa, 4.0–8.0 mm basi lata, 1.0–3.0 mm medio lata; *alae* hyalinae, chartaceae, 2.0 mm latae, 5–10 cm longae (15–40% per foliae longitudinem ascendentes), apicibus attenuates; *subula* teres, atroviridis, attenuata; *stomata* praesentia; *squamae* et *phyllopodia* absentia. *Sporangium* ellipticum, concolor, aetate hyalinum, 3.0–9.0 mm longum, 2.0–5.0 mm latum, basale. *Velum* incompletum. *Ligula* lanceolata, auriculata, 2.0–6.0 mm longa, 1.5–3.5 mm lata. *Labium* ligulatum, 1.0–1.5 mm longum, 0.2–0.25 mm latum. *Meagspora*e albae, 630–(750)–870 µm diametro, reticulatae, zona absentia. *Microspora*e murinae, 38.0–41.0 µm longae, 25.0–28.0 µm latae, laevigatae.

Corm globose, 2–3-lobed, 10–18 mm wide, 11–14 mm high; *roots* dichotomously branched. *Leaves* 10–38, erect, 11–30 cm long, 4.0–8.0 mm wide at the base, 1.0–3.0 mm wide at mid length; *alae* hyaline, chartaceous, 2.0 mm wide

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FIGS. 1-3. Holotype of *Isoetes araucaniana* (M. DeVore 1590 & M. Baeza, MU). 1. Habit showing corm and leaf bases; scale bar = 5 cm. 2. Adaxial view of microsporophyll base showing sporangium, incomplete velum, ligule fragment and ligulate labium; scale bar = 2 mm. 3. Adaxial view of megasporophyll and megasporangium with incomplete velum, ligule fragment and labium; scale bar = 2 mm. li = ligule; la = labium; ve = velum.



FIGS. 4–10. SEM images of *I. araucania* megaspores and microspores (K.H. & W. Rechinger 63165, M). 4. Proximal view of megaspore; scale bar = 250 μm . 5. Distal view of megaspore; scale bar = 500 μm . 6. Equatorial view of megaspore; scale bar = 500 μm . 7. Detail of the proximal sculpture; scale bar = 50 μm . 8. Proximal view of microspore; scale bar = 10 μm . 9. Equatorial view of microspore; scale bar = 10 μm . 10. Detail of the distal sculpture; scale bar = 5 μm .

at the sporangium, 5–10 cm long (extending up for 15–40% of the leaf length), apices attenuate; *subula* terete, dark green, attenuate; *stomata* present; *scales* and *phyllopodia* absent. *Sporangium*, elliptic, concolorous, hyaline with age, 3.0–9.0 mm long, 2.0–5.0 mm wide, basal. *Velum* incomplete, occasionally

TABLE 1. Morphological comparison between *Isoetes araucaniana* and *Isoetes chubutiana*.

	<i>I. araucaniana</i>	<i>I. chubutiana</i>
Leaf color	Light to medium green	Dark green
Labium	Ligulate, occasionally bifid, 1–1.5 mm long, 0.2–0.25 mm wide	Inconspicuous to absent
Ligule	Lanceolate with pronounced basal lobes, to 2.0–6.0 mm high, 1.5–3.5 mm wide	Deltate to widely ovate, chordate to hastate, dark 1.5–3.0 mm high, 1.7–2.3 mm wide
Microspores	Laevigate	Sparsely to densely echinate
Megaspores size Mean: range	750: 630–870 μm	595: 460–750 μm
Megaspore ornamentation	Densely and distinctly reticulate; the muri generally as tall or taller than the diameter of the included areole	Rugulate to low and sparsely reticulate; the muri low, much lower than the diameter of the included areole
Megaspore girdle	Absent	Weakly differentiated to distinctly smooth

covering 25% of the upper portion of the sporangium. *Ligule* lanceolate with pronounced basal lobes, to 2.0–6.0 mm high, 1.5–3.5 mm wide. *Labium* ligulate, occasionally bifid, 1–1.5 mm long, 0.2–0.25 mm wide, delicate and often ephemeral. *Megaspores* 630–(750)–870 μm in equatorial diameter, reticulate, the muri strongly developed and distinct; girdle undifferentiated. *Microspores* 38–41 μm long, 25–28 μm wide, laevigate, minutely rugulate to granulate at higher magnification.

Isoetes araucaniana is endemic to Chile and is known only from collections made in Nahuelbuta National Park in Araucanía. It grows in streams at elevations of 800 to 1500 m, in *Araucaria araucana*-*Nothofagus dombeyi* mixed forest.

The only other described species of *Isoetes* growing even marginally close to *I. araucaniana* is *I. chubutiana* Hickey, Macluf & Taylor. *Isoetes araucaniana* is distinctive (Table 1) in possessing smooth microspores, a narrowly ligulate (sometimes bifid) labium, and larger megaspores with a tightly reticulate ornamentation of tall, distinctive muri (Hickey *et al.*, 2003). Undamaged muri in megaspores of *I. araucaniana* are tall and thin, typically as high as the diameter of the included areoles (Figs. 4–6). In contrast, the muri of *I. chubutiana* are much shorter than the diameter of the included muri. Finally, the megaspore reticulations of *I. araucaniana* continue uninterrupted across the girdle region; in *I. chubutiana* the girdle typically has little or no ornamentation.

PARATYPES.—CHILE. **Araucanía:** Nahuelbuta, 1000 m, 30 Jan 1901, *T. G. s.n.* (CONC); Prov. Malleco, Dpto. Angol, Parque Nacional de Nahuelbuta, Centro del Parque, 1250 m, 37°46'S, 73°02'W, 7 Jan 1968, *Ricardi, Marticorena y Matthei 1832, 1833* (CONC); Angol, Parque Nac. Nahuelbuta-Vag, 1460 m, 7 Jan 1968, *G. Montero O. 8116* (CONC); Küstenkordillere, am Nahuelbuta, Sumpfstellen und Araukarien-Nothofagus-Wald, 1250 m, 28 Dec 1968, *H.*

Merxmüller 25085 (M); Prov. Malleco, Parque Nacional de Nahuelbuta, 1460 msm, 15 April 1972, *R. Rodríguez* (CONC); VIII Región, Prov. Arauco, Cordillera de Nahuelbuta, loma del Consorcio, en mallín, semi enterrado, en pequeñas pozas de agua estancada, 925 msm, 37°34'S, 7°12'W, 13 Dec 1983, *O. Matthei y M. Quezada 35* (CONC); Region of Araucanía, Prov. Malleco. Alt.1300 m, 28 Oct, 1987. *K. H. & W. Rechinger 63165* (M); Nahuelbuta National Park, near Agua Caliente, ca. 42 km from Angol, *Araucaria araucana* – *Nothofagus dombeyi* mixed forest, 22 Jan 1975, *M. Nishida, M. Ono, T. Hashimoto & N. Ohga 750002 [751302], 750003 [751303]* (SGO).

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